CLAIMS:

1. A device for the detection of analyte molecules, the device comprising at least one pair of source-drain electrodes and at least one gate electrode to thereby define at least one Field Effect Transistor (FET), wherein said at least one gate electrode is coated with a layer of receptor molecules that in the presence of said analytes catalyze a reaction that causes release of ions in a medium surrounding said receptor molecules, and a monolayer of linker molecules is provided for linking said receptor molecules to said at least one gate such that a distance between the receptor molecules layer and the surface of the coated gate is smaller than 15Å.

2. A device according to claim 1, wherein said distance is of a few angstroms.

3. A device according to claim 1 or 2, wherein the Field Effect Transistor is an Ion Sensitive Field Effect Transistor.

4. A device according to any one of preceding claims, wherein the receptor molecules are enzymes or peptides.

5. A device according to claim 4, wherein the receptor molecules is acetylcholine esterase.

6. A device according to any one of preceding claims, wherein said analyte molecules are selected from chemical agents used in agriculture, in environmental applications, industry and chemical warfare.

7. A device according to claim 6, wherein said chemical agents are pesticides, herbicides, nerve agents and synthetic or natural toxins emitted from industrial plants.

8. A device according to any one of preceding claims, wherein said gate electrode is an ion sensitive oxide gate.

9. A device according to claim 8, wherein the ion-sensitive oxide is Aluminum Oxide (Al_2O_3), Silicon Nitride (Si_3N_4), Indium Tin Oxide (In_2O_3-Sn_2O_3), Silicon Oxide (SiO_2) or Tantalum Oxide (Ta_2O_5).

10. A device according to claim 1, wherein said linker molecules are covalently bound to at least one of the surface or the receptor molecules.

11. A device according to claim 8, wherein said linker molecules are selected from conjugated or unconjugated aliphatic, aromatic or heteroaromatic molecules, having at least one functional group capable of covalently binding to said surface and at least one functional group capable of covalently binding to said receptor molecules.

12. A device according to any one of preceding claims, comprising an array of gate electrodes each gate electrode being coated with receptor molecules layer different from that of the other gate electrodes.

13. A device according to claim 12, wherein said array of gate electrodes is associated with the same source-drain pair.

14. A device according to claim 12, wherein each of the gate electrodes is associated with a different source-drain pair.

15. A method of detecting analyte molecules in a medium, the method comprising:

(a) providing at least one Field Effect Transistor (FET) formed by a source-drain electrode pair and at least one gate electrode that is coated with a layer of receptor molecules that in the presence of certain analytes catalyze a reaction that causes release of ions in a medium surrounding said receptor molecules, and a monolayer of linker molecules for linking said receptor molecules to said at least one gate such that a distance between the receptor molecules layer and the surface of the coated gate is smaller than 15Å.

(b) accommodating said at least one FET such that said at least one gate is exposed to a medium suspected of containing analyte molecules capable of reacting with the receptor molecules, thereby affecting a release of ions in said medium, and

(c) monitoring a change in an electric current between the source and drain electrodes caused by the release of ions, said change being indicative of the presence of said analyte in the medium, thereby enabling measuring the analyte concentration in the medium.

16. A method according to claim 15, wherein said medium is one of the following: water, sea water, buffer, and ionic solution.